

Appl. No. 10/718,913
Reply to Office Action of July 12, 2005

Docket No. MIT-152AUS

REMARKS

The above-identified patent application has been amended and Applicants respectfully request the Examiner to reconsider and again examine the claims in view of the following remarks.

Claims 1-20 are pending in the application. No claims are yet allowed. Claims 1-20 are rejected. Claims 9 and 10 are amended herein. No claims have been added or cancelled by this Amendment. The amendments to Claims 9 and 10 are directed to matters of form and have not been made to overcome any prior art rejections.

In accordance with the revised provisions of 37 C.F.R. §1.121(c) as enacted on July 30, 2003, a marked up version of the amended claims is provided above.

The Examiner rejects Claims 1, 10, and 11-20 under 35 U.S.C. §103(a) as being unpatentable over Rahman (U.S. Patent No. 6,821,212) in view of Scanlon (U.S. Patent No. 5,853,005) and Beard (U.S. Patent No. 5,112,296).

Applicants submit that Claim 1 is patentably distinct over the combination of references cited by the Examiner since the combination neither describes nor suggests ... a ... powered orthotic device ... comprising ... a brace ... that ... traverses a joint of the person ... including at least one strap for attaching the brace to the body part of the person ... sensing means, fixed in at least one of the at least one straps ... said sensing means senses a surface electromyographic (EMG) signal of the muscles connected to the joint and determines a desired joint torque from the EMG signal and provides a sensor signal in response thereto ... and an actuator [which] provides a force having a magnitude which is proportional to a magnitude of the sensor signal provided by said sensing means and wherein the ratio of power delivered by said actuator to the mass of the actuator takes into account all of the elements needed to generate the force as called for in Claim 1.

The Examiner asserts that Rahman discloses, in figure 3, a powered orthotic device substantially as claimed. Applicants respectfully disagree with this statement. As pointed out in

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Applicants' last Response (filed on March 23, 2005), the Rahman reference itself at Col. 6, lines 20-26 explicitly states that a sensing mean is not shown in Rahman. Furthermore, Rahman fails to describe straps for attaching a brace to a body part. Thus, the basis for the Examiner's position that Rahman discloses the device substantially as claimed is not clear to the Applicants.

The Examiner relies upon Beard for teaching sensors and relies upon Scanlon for teaching sensors inside of a strap. In particular, the Office Action states:

Rahman discloses in figure 3 a powered orthotic device, substantially as claimed. However, Rahman doesn't disclose the sensors inside of the strap or a first and second strap. Scanlon teaches in figure 10 a monitoring device comprising first and second straps 104 and a sensor 12 on the inside of the straps. Beard teaches in figures 1-5 a powered orthotic comprising a power source 12, a cable 3 and a muscle sensing means 43. It would have been obvious to one having ordinary skill in the art at the time that the invention was made that the sensor disclosed by Rahman could be inside of the first and second straps as taught by Scanlon in order to locate the sensor adjacent to muscle. The device disclosed by Rahman could be operated by the power source as taught by Beard. The sensor as taught by Beard could be substituted for the sensor disclosed by Rahman in order to be able to senses muscle movement. The control as taught by Beard could be used to lock the device in place.

Scanlon describes a sling for transporting animals. The Scanlon sling is provided from two bands (also referred to as straps in Scanlon). The animal rests in the sling and the weight of the animal itself essentially holds the animal in the sling. The sling does not attach a brace to a body part of a person as called for in Claim 1. Moreover, the Examiner has not provided any explanation as to how the Scanlon sling could be modified to attach a brace to a body part of a person as called for in Claim 1 and it does not appear to Applicants that it would be possible to modify the Scanlon sling to do so, This conclusion is even more compelling when one considers that Scanlon describes the straps which make up the sling as being made from materials requiring the following characteristics: strength (so as to bear the weight of an animal such as a dolphin), waterproofing and good acoustic properties. Kevlar is provided as an exemplary material from which the straps can be made.

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Also, the Examiner's reasoning that the sensor taught by Beard could be substituted for the sensor taught by Rahman is faulty given that, as pointed out above, Rahman neither describes nor suggests a sensor.

To the extent that the Examiner is implying that the sensor of Beard could be substituted for the sensor of Scanlon, Applicants would like to point out that the Scanlon teaches an acoustic sensor while Beard teaches an EMG sensor and shows the sensor coupled to the skin of a person. If the Beard EMG sensor were mounted inside of a fluid filled bladder as suggested by Scanlon, the Beard EMG sensor would not operate correctly.

Given that Rahman neither describes nor suggests straps nor sensors, it is unclear how Rahman would be modified to include straps such as those taught by Scanlon and the sensor taught by Beard. This is particularly true given that, as mentioned above, Scanlon teaches using straps as a sling which merely serves to support an animal's weight. The Scanlin straps do not attach a brace to a body part of a person as called for in Applicants Claim 1. Thus, Applicants submit that the combination suggested by the Examiner neither describes nor suggests the invention as defined by Claim 1.

In view of the above, Applicants submit that Claim 1 is patentably distinct over the cited reference.

Claim 10 depends from and thus includes the limitations of independent Claim 9 which recites a powered orthotic device ... comprising ... an external actuator coupled to receive [a] sensor signal and in response ... provides a force having a magnitude which is proportional to a magnitude of the sensor signal ... wherein a ratio of power delivered by said actuator to the mass of the actuator takes into account all of the elements of the powered orthotic device needed to generate the force.

In order to establish a prima facie case of obviousness the prior art reference (or prior art references) must teach or suggest all of the claim limitations (see MPEP §2142). In this case, Applicants respectfully submit that the Examiner has not met this burden since the references relied upon by the Examiner neither describe nor suggest an external actuator which provides a

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force having a magnitude which is proportional to a magnitude of a sensor signal with a ratio of power delivered by said actuator to the mass of the actuator takes into account all of the elements of the powered orthotic device needed to generate the force as called for in Claim 10.

Thus, Applicants submit that Claim 10 is patentably distinct over the combination suggested by the Examiner.

Applicants submit that Claim 10 is further patentably distinct over the combination suggested by the Examiner since the references neither describe nor suggest first and second straps coupled to first and second hinge portions ... a continuous cable disposed around [a] cable wheel within [a] groove and retained on one of the first and second straps such that when the cable is moved, the cable wheel rotates, causing the first and second straps to move relative to each other as called for in Claim 10.

Applicants submit that independent Claim 11 is patentably distinct over the combination of references cited by the Examiner since some of the claim features simply do not appear to be found in any of the references. In particular, the references neither describe nor suggest first and second straps coupled to first and second hinge portions ... a continuous cable disposed around [a] cable wheel within [a] groove and retained on one of the first and second straps such that when the cable is moved, the cable wheel rotates, causing the first and second straps to move relative to each other as called for in Claim 11.

The Examiner rejects Claims 2-5, 7 and 9 under 35 U.S.C. §103(a) as being unpatentable over Rahman (U.S. Patent No. 6,821,212) in view of in view of Scanlon Patent No. 5,853,005), Beard (U.S. Patent No. 5,112,296) and Petrofsky (U.S. Patent No. 5,888,212).

The Examiner asserts that Rahman discloses a powered orthotic in Figure 3. The Examiner concedes that Rahman fails to disclose, a sensor, first and second straps, a means for scaling the sensor and an active feedback loop circuit. The Examiner asserts, however, that Scanlon and Beard teach straps and a sensor and that Petrofsky teaches a computer controlled hydraulic resistance device comprising a sensing and control in a closed loop manner and a means for scaling the sensor signal. The Examiner thus concludes that it would have been

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obvious to combine the elements of Scanlon, Beard and Petrofsky with the system of Rahman to render obvious Claims 2-5 and 7. Applicants respectfully disagree.

Claim 2 depends from and thus includes the limitations of Claim 1. Claim 1 calls for ...a brace ... including at least one strap for attaching the brace to the body part of the person ... sensing means, fixed in at least one of the at least one straps such that when said strap is coupled to the body part said sensing means is coupled to at least one muscle of the person ... and an actuator ... [which] ... provides a force having a magnitude which is proportional to a magnitude of the sensor signal provided by said sensing means and wherein the ratio of power delivered by said actuator to the mass of the actuator takes into account all of the elements needed to generate the force .

Thus Claim 2 is patentably distinct over the combination of references cited by the Examiner since the combination of references neither describes nor suggests a powered orthotic device comprising ... a brace ... including at least one strap for attaching the brace to the body part of the person ... sensing means, fixed in at least one of the at least one straps such that when said strap is coupled to the body part said sensing means is coupled to at least one muscle of the person ... and an actuator ... [which] ... provides a force having a magnitude which is proportional to a magnitude of the sensor signal provided by said sensing means and wherein the ratio of power delivered by said actuator to the mass of the actuator takes into account all of the elements needed to generate the force

Claims 3-5 and 7 also depend directly or indirectly from Claim 1 and thus also include the limitations of Claim 1. Thus, Applicants submit that Claims 3-5 and 7 are patentably distinct over the cited references taken in combination at least for the reasons discussed above.

Claim 9 is patentably distinct over the cited references since the references neither describe nor suggest a brace adapted to be coupled to a body part of the person and having a length such that the brace traverses a joint of the person; sensing means coupled to at least one muscle of the person wherein in response to the person attempting to move the body part, said sensing means noninvasively senses a desired muscular force of the person and provides a sensor signal in response thereto; an external actuator coupled to receive the sensor signal from said

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sensing means and in response to the sensor signal said external actuator provides a force having a magnitude which is proportional to a magnitude of the sensor signal provided by said sensing means wherein a ratio of power delivered by said actuator to the mass of the actuator takes into account all of the elements of the powered orthotic device needed to generate the force; and a control means coupled to said external actuator, said control means including means for making a low impedance measurement of output torque and for providing a feedback signal to said external actuator to ensure an accurate application of the force provided by said external as called for in Claim 9.

The Examiner rejects Claims 6 and 8 under 35 U.S.C. §103(a) as being unpatentable over Rahman in view of in view of Scanlon, Beard, Petrofsky and Scorvo.

Claims 6 and 8 each depend, either directly or indirectly, from base Claim 1. Thus, both Claims 6 and 8 call for ... a ... powered orthotic device ... comprising ... a brace ... that ... traverses a joint of the person ... including at least one strap for attaching the brace to the body part of the person ... sensing means, fixed in at least one of the at least one straps ... said sensing means senses a surface electromyographic (EMG) signal of the muscles connected to the joint and determines a desired joint torque from the EMG signal and provides a sensor signal in response thereto ... and an actuator [which] provides a force having a magnitude which is proportional to a magnitude of the sensor signal provided by said sensing means and wherein the ratio of power delivered by said actuator to the mass of the actuator takes into account all of the elements needed to generate the force .

As pointed out above in conjunction with Claim 1, it is Applicants position that the combination of the Rahman, Scanlon and Beard references relied upon by the Examiner neither describe nor suggest the above features and the addition of Petrofsky and Scorvo to the Rahman, Scanlon and Beard combination does nothing to the remedy the deficiencies.

Thus, Applicants submit that Claims 6 and 8 are patentably distinct over the cited references taken in combination..

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In view of the above Amendment and Remarks, Applicants submit that Claims 1-20 and the entire case are in condition for allowance and should be sent to issue and such action is respectfully requested.

The Examiner is respectfully invited to telephone the undersigning attorney if there are any questions regarding this Response or this application.

The Assistant Commissioner is hereby authorized to charge payment of any additional fees associated with this communication or credit any overpayment to Deposit Account No. 500845, including but not limited to, any charges for extensions of time under 37 C.F.R. §1.136.

Dated: 40505

Respectfully submitted,

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